Business Benefits from Plant Energy Assessments and Energy Management

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Would you like to improve your process operations? Could you use an extra $100,000 to operate your textile mill? If so, an energy assessment and energy improvement project may be for you. In pursuit of higher productivity and lower operating costs, M.J. Soffe, a producer of athletic clothing, recently assessed its steam, motor, and compressed air systems for improvement opportunities at their largest and most integrated manufacturing plant. The facility reports that it increased its throughput capacity by 37percent while reducing the energy needed per pound of product by 38 percent, saving $165,000 annually in fuel expenditures.

As with many energy projects, M.J.Soffe found that the benefits are not limited to utility and fuel cost savings, but also include improved productivity, increased equipment life, decreased risk of financial penalties, and increased order turnaround. A plant energy assessment identified the savings opportunities detailed in Table 1. Environmental emissions and penalty risks are also generally improved with energy efficiency projects. These projects are often low-risk investments and easily implemented. For example, when a Georgia Pacific plywood plant in Georgia insulated several steam lines leading to its pulp dryers and replaced steam traps, it lowered emissions of greenhouse gases and Clean Air Act pollutants by 9.5 million lbs of carbon dioxide (carbon equivalent), 3,500 lbs. of SOx, and 26,000 lbs of NOx on an annual basis.[2]

Importance of Energy Management

Because of the power of the plant audit to lead toward impressive improvements, the U.S. Department of Energy (DOE) partners with U.S. manufacturers to take a comprehensive, systems approach to increasing energy efficiency and savings opportunities, focusing on steam, motor, compressed air, combined heat and power, and process heating systems. On August 1, 2000, DOE re-opened a solicitation for industrial manufacturing plant-wide energy assessment proposals. Under the proposal, DOE shares up to 50 percent

Table 1. Sample Energy Assessment Findings

OPPORTUNITY	DESCRIPTION
Steam and Wastewater Heat Recovery	Costs of boiler fuel and treatment chemicals were artificially inflated by an inefficient water heating system that could not keep up with production surges. This resulted in thousands of gallons of hot water to be dumped and excessive steam and steam condensate waste. $140,000 annually was saved through increased steam condensate recovery and recovery of heat from the wastewater coupled with a steam trap maintenance plan. Heat recovery allowed reduction of steam generation pressure with only one boiler needed for production rather than two. Reduced steam pressure also means longer equipment life. Dyeing capacity increased by 37 percent, also increasing order turnaround, in a project with a 2.7 year payback time.
Motor and Compressed Air Systems	Risk of electric utility penalties was reduced by improving the plant power factor. This was done by implementing a motor purchase and replacement policy and more efficient motor utilities. Electricity costs also went down by $10,000 per year by joining two compressed air systems and turning off a large air compressor. The more reliable system requires less maintenance. [1]

of the plant assessment cost, up to a $100,000 limit. DOE also provides technical assistance, tools, and resources as desired by the company.

The true demands of energy production are significant. Steam systems, integral to many textile drying processes, account for approximately 35 percent of fuel used by U.S. textile manufacturing plants.[3] Further, the Alliance to Save Energy estimates that a typical plant can improve the efficiency of its steam system by 20 to 30 percent through opportunities in steam generation, distribution, end use, and recovery. Thus, the textile industry can particularly benefit by keeping steam systems in tune.

Resources for Improving Plant Performance

Many manufacturers may be interested in improved energy management, but where do they start? A collection of public resources is available for systems operations and maintenance. Although much commercial information focuses only on particular system components, DOE has established a library of information as a "one-stop shop" on entire plant energy systems. For example, in partnership with a public/private network of organizations and the Alliance to Save Energy, a national non-profit organization, many steam-system specific resources have been developed. The DOE offerings include:

- Sourcebooks that give a comprehensive system overview and reference sources for specific information.
- Best practice tip sheets with technical improvement suggestions.
- Case studies that highlight what leading companies have accomplished in business performance improvement.
- Training courses and commercial training course lists in motor, compressed air, and steam systems.
- Free plant audits for small and medium manufacturers through the Industrial Assessment Centers(IAC). The IACs are university teams composed of students and professionals.
- Software for motor management, optimizing insulation, screening pumps, and assessing plant cogeneration feasiblity.
- Deployment of state-of-the art emerging technologies developed by and for the paper industry and/or other manufacturing sectors.
- Technology research and development opportunities to help create tomorrow's technology for the manufacturing plant.

Additionally, a technical assistance hotline is available to answer many plant energy system questions through the BestPractices clearinghouse and website. Together, the Clearinghouse and the website allow access to the cost sharing agreement and all resources.

Steps for Better Performance

Step 1: Assessment

Go through your plant to look for savings opportunities. To help determine which systems offer the largest potential in savings, the DOE cost-share proposal enhances the financial appeal of energy auditing. Many private companies specialize in specific system auditing, and can help from there.

Step 2: Salesmanship to Financial Decision-Makers

Prepare an energy improvement project proposal in language compelling to upper company management. Part of this process is becoming knowledgeable on the financial criteria your company uses to screen projects, such as internal rate of return or return on assets. Meet with your company accounting and management staff. It can help to increase understanding of what each side needs and expects. It can also improve your project funding prospects.

It must be remembered that energy improvement projects may bring a host of plant changes, such as decreased downtime, a safer workplace, increased employee productivity, increased plant maintenance, plant productivity improvements, and decreased waste. A proper project proposal will attempt to quantify these savings and costs so the project impacts are clear to the financial decision-makers. The Alliance to Save Energy offers some guidance in this area.

Step 3: Implementation

Look at the DOE BestPractices website and call the Clearinghouse. Determine which of the re-

sources are most likely to help you with plant improvements. Tip sheets are very useful in improving maintenance practices and are specific enough to offer guidance.

Step 4: Documentation

Record the project process and results. Documentation allows successful projects to be replicated throughout the company. It is important to share project benefits to help institutionalize the knowledge and experience gained, so others may follow where a few have led. Otherwise, success is dependent on a few people, who may or may not be available.

Step 5: Networking

Other companies can also have valuable insights on improvement. To the extent possible, networking between companies is a powerful way to discover what the best are doing and share successes. Networking gives access to the universe of successes which can benefit your operation. DOE will also partner with you to discover these external successful projects and help document your project in a case study.

Taking advantage of peer contacts, conferences, and workshops is invaluable in making these connections.

Conclusion

Too many manufacturing facilities are not achieving their full potential because of poorly-operating energy systems. Energy efficiency lies at the rarely visited intersection of improved economic performance, greater process efficiency, and environmental benefit—a win-win-win situation. By taking advantage of public and private energy management resources and following key steps in assessment, salesmanship to financial decision-makers, implementation, documentation, and networking, you, too, can realize success.

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